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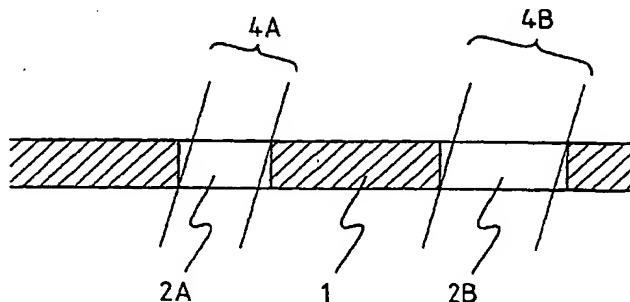
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(54) Title: PERFORATION PATTERN WITH AN IMAGE THAT DEPENDS ON THE VIEWING ANGLE



(57) Abstract: The invention relates to a carrier provided with a perforation pattern arranged by a laser, which perforation pattern provides an image depending on the angle of view, wherein such an effect depending on the angle of view is likewise obtained by applying perforations with a different dimension in a different direction.

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PERFORATION PATTERN WITH AN IMAGE THAT DEPENDS ON THE VIEWING ANGLE

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The invention relates to a carrier provided with a perforation pattern arranged by laser, which perforation pattern provides an image depending on the angle of view.

Such a carrier is known from the Netherlands patent
10 application 1012460.

The effect of an image depending on the angle of view is herein achieved by arranging perforations at an oblique angle in the carrier of a certain thickness, for instance 0.8 mm in the Netherlands passport.

15 This requires major structural modifications of the device for making such a pattern. For carriers of a certain thickness as stated above, the effect of the obliquely arranged holes is readily visible. However, the thinner the carrier becomes, the less noticeable the effect becomes.

20 The object of the present invention is to provide a carrier which can be thick (for instance about 0.8 mm) as well as thin (for instance about 0.1 mm), wherein such an effect can be achieved.

This object is achieved in that at least some of the
25 number of perforations of the perforation pattern have a different dimension in two directions parallel to the main plane of the carrier.

Such an effect depending on the angle of view is also obtained by applying perforations with a different dimension
30 in a different direction.

Although the invention is in no way limited to application on documents representing value such as passports, driving licences, bank notes, postage stamps and

cheques, the advantages of the invention are most clearly manifest in this application.

According to a further preferred embodiment, the perforations extend perpendicularly of the main plane of the carrier.

The problems of an oblique angle between laser beam and carrier are herein obviated.

According to yet another preferred embodiment, the perforations with their different longitudinal axis in the plane parallel to the main plane of the carrier have an oval shape.

An oval is a shape without acute angles, and can thus be arranged more easily with a laser.

The invention is however in no way limited to such oval openings; it is for instance possible to arrange rectangular holes with rounded ends; the effect according to the invention is herein also achieved.

It is noted here that a significant part of the security lies in the difficulty of arranging such a pattern. With usual laser equipment it is possible to arrange round perforations with dimensions which are visible when the carrier is held up to the light. Making smaller perforations is therefore pointless. In order to nevertheless increase the difficulty of copying, it is therefore attractive to arrange differently shaped holes, wherein an oval is found to be a good choice. The arranging of ovals already provides a certain degree of protection per se since the arranging of such oval openings raises a high technical threshold, while ovals provide the option of displaying the above stated effect of a changing image at a varying angle of view.

It is further pointed out here that copying is made more difficult when the perforation pattern at least partly comprises perforations with an oval area, the smallest

dimension of which is smaller than the smallest dimension which can be realized with a laser light source with a wavelength of 10.6 μm .

This raises very high technical thresholds. Applying the invention on a commercial scale requires a high speed of the laser equipment. This speed can only be achieved by applying so-called AODs, i.e. acousto-optical deflectors. At the usual wavelength of 10.6 μm the use of such acousto-optical deflectors is difficult as a result of the dissipation and other adverse effects occurring therein.

By applying another wavelength, wherein these drawbacks occur in considerably smaller measure, applicant has succeeded in applying such AODs, whereby the present invention has become realizable.

The present invention thus also provides a method for arranging a laser pattern in a carrier, which method is characterized in that oval perforations are arranged and wherein use is made of a wavelength which is smaller than 10.6 μm .

The invention therefore also provides a device for arranging a laser pattern in a carrier which is characterized in that the device is adapted to arrange oval perforations, wherein the device is adapted to generate a laser beam with a wavelength which is smaller than 10.6 μm .

The present invention will now be elucidated with reference to the annexed figures, in which:

Figure 1a is a cross-sectional view of a carrier which is provided with two perforations with different dimensions in the direction of the cross-section;

Figure 1b is a view corresponding with figure 1a in a different situation;

Figure 2 is a top view of a carrier which is provided with a perforation pattern according to a first embodiment of

the present invention;

Figure 3 is a cross-sectional view of a carrier with a perforation pattern according to a second embodiment of the present invention;

5 Figure 4a is a top view of an oval opening; and

Figure 4b is a top view of a rectangular opening with semi-circular ends.

Figure 1a shows a carrier 1, which is for instance formed by a document representing value such as a card which is for instance incorporated in a passport. Only two openings 10 2a and 2b are arranged herein for the purpose of elucidation, wherein opening 2a is smaller in the direction of the shown cross-section than that of opening 2b in the same direction. In the case of a straight angle of view, wherein the light 15 beams to be caught by the eye are shown by lines 3a respectively 3b, it has been found that the amount of transmitted light is proportional to the width of perforation 2a respectively 2b. It is assumed here - for the sake of simplicity - that the dimensions are the same in the 20 direction transversely of the shown cross-section.

Figure 1b shows the same carrier 1 in which the same openings 2a, 2b respectively are arranged. With an oblique angle of view, which is represented by light beams 4a, 4b respectively, it has been found that both light beams are 25 narrowed. They are narrowed by the same width. As a result of the fact that opening 2a is smaller than opening 2b, the relative decrease in the light beam width at the small opening 2a is greater than that at the opening 2b.

It will be apparent that the relation between the 30 thickness of the carrier and the size of the openings is important. The described effect is found to still work in carriers which are as thin as a sheet of paper. Furthermore, the edge of the opening will not be wholly cylindrical when

laser equipment is used; the phenomenon whereby the material is removed occurring as a result of supplying laser energy is formed on the one hand by evaporation and disintegration of the material, but also due to phenomena resembling

5 combustion.

The removed material will hereby not have a precisely cylindrical form, whereby variations in the above outlined model result.

The invention can be implemented in a number of ways. It is thus possible to combine the preferably applied oval openings with round openings, as shown in figure 2. Figure 2 shows a pattern of 8x5 openings substantially formed by round openings. A group of openings with the configuration of the letter P is embodied as an oval opening. The longitudinal axis of these openings extends in one direction. It is herein ensured that the surface area of the oval openings is the same as the surface area of the round openings. When this pattern is thus given a sufficiently small form, the pattern of the letter P will not be visible in a straight line of view.

When the line of view is tilted, for instance in the direction parallel to the longitudinal direction of the oval openings, the amount of light which is visible through the oval openings will decrease more slowly, and later disappear completely, than that of the round openings.

In the above embodiment a letter P is used.

It will be apparent that other images, for instance representations of photos, can be used instead of letters.

These photos can be formed by the image which is normally visible, i.e. at a straight angle of view, wherein the second image only becomes visible during tilting.

Figure 3 shows another embodiment wherein a pattern is arranged of elongate perforations 9 with a longitudinal axis

in a first direction. Some of the perforations of the pattern, i.e. perforations 10, are likewise oval but have the longitudinal axis in a direction extending perpendicularly thereof.

5 The surface area of both types of oval opening 9, 10 is herein chosen such that at a normal, i.e. straight, angle of view, a first pattern can be seen, for instance a photo. When the carrier is tilted, whereby another angle of view is created, the second pattern becomes visible, in the present
10 case a letter E.

Figure 4 shows a perforation pattern made up of rectangular openings with rounded ends instead of oval openings. The letter "A" herein becomes visible during tilting.

15 It will be apparent that numerous variations can be applied to the embodiments shown here. It is thus possible to vary the degree of ovality, i.e. the ratio between longitudinal axis and transverse axis of the openings, so as to achieve intermediate tones.

20 The same effect is also possible by varying the angle of the axis of the ovals. The two variation options can be combined.

It is also possible to make a combination of the embodiment shown here of substantially cylindrical
25 perforations extending transversely of the main direction of the carrier, and perforations extending at an oblique angle.

CLAIMS

1. Carrier provided with a perforation pattern arranged by laser, which perforation pattern provides an image
5 depending on the angle of view, characterized in that at least some of the number of perforations of the perforation pattern have a different longitudinal axis in two different directions parallel to the main plane of the carrier.

2. Carrier as claimed in claim 1, characterized in that
10 the carrier is a document representing value.

3. Carrier as claimed in claim 1 or 2, characterized in that the perforations extend perpendicularly of the main plane of the carrier.

4. Carrier as claimed in claim 1, 2 or 3, characterized
15 in that the perforations with a different longitudinal axis in the plane parallel to the main plane of the carrier have an oval shape.

5. Carrier as claimed in any of the foregoing claims, characterized in that the perforation pattern displays a
20 first image at a line of view extending perpendicularly of the carrier, and that the perforation pattern displays a second image at a line of view differing therefrom.

6. Carrier as claimed in any of the foregoing claims, characterized in that the perforation pattern comprises round
25 perforations, and that the part of the number of perforations with a different longitudinal axis in the plane parallel to the main plane has an oval shape.

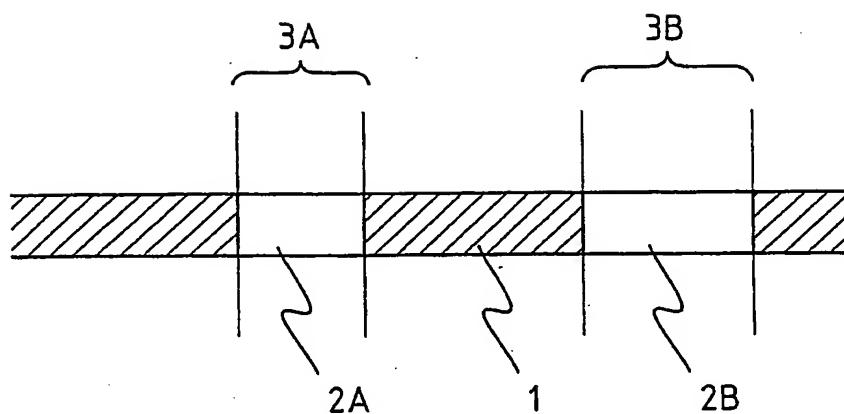
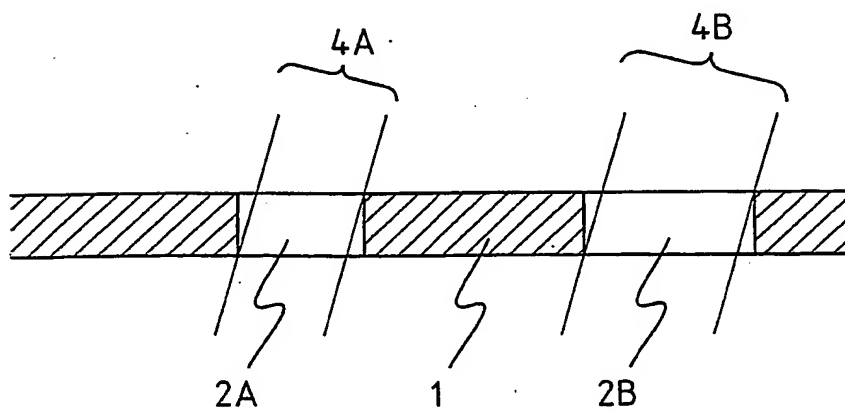
7. Carrier as claimed in any of the claims 1-5, characterized in that the perforation pattern comprises oval
30 perforations with a longitudinal axis in a first direction, and that the part of the number of perforations is oval with a longitudinal axis in a second direction differing from the first direction.

8. Carrier as claimed in any of the foregoing claims, characterized in that the perforation pattern at least partly comprises perforations with an oval area, the smallest dimension of which is smaller than the smallest dimension
5 which can be realized with a laser light source with a wavelength of 10.6 μm .

9. Method for arranging a laser pattern in a carrier, characterized in that oval perforations are arranged and that use is made of a wavelength which is smaller than 10.6 μm .

10 10. Device for arranging a laser pattern in a carrier, characterized in that the device is adapted to arrange oval perforations, and that the device is adapted to generate a laser beam with a wavelength which is smaller than 10.6 μm .

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FIG. 1AFIG. 1B

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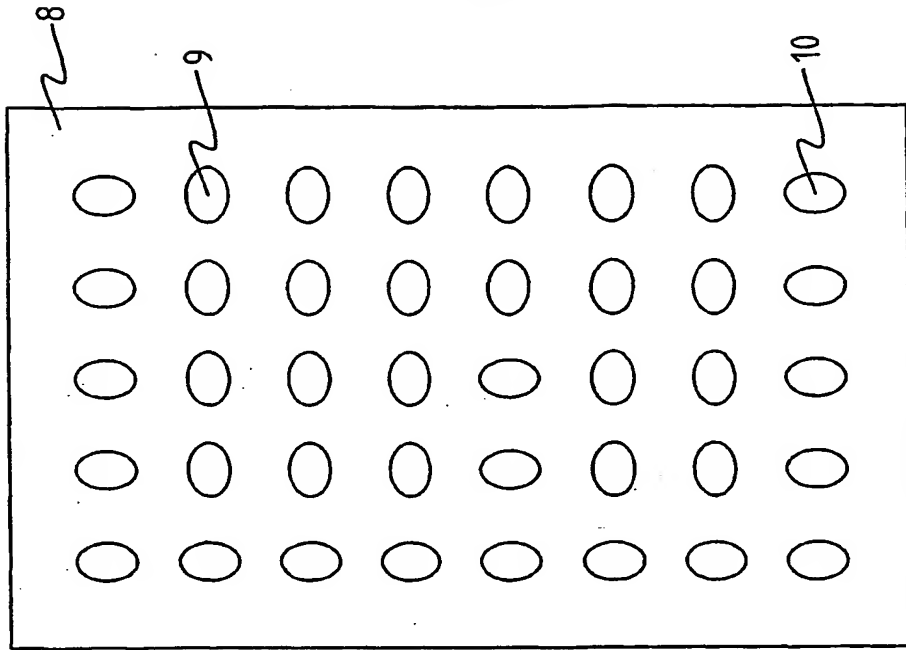


FIG. 3

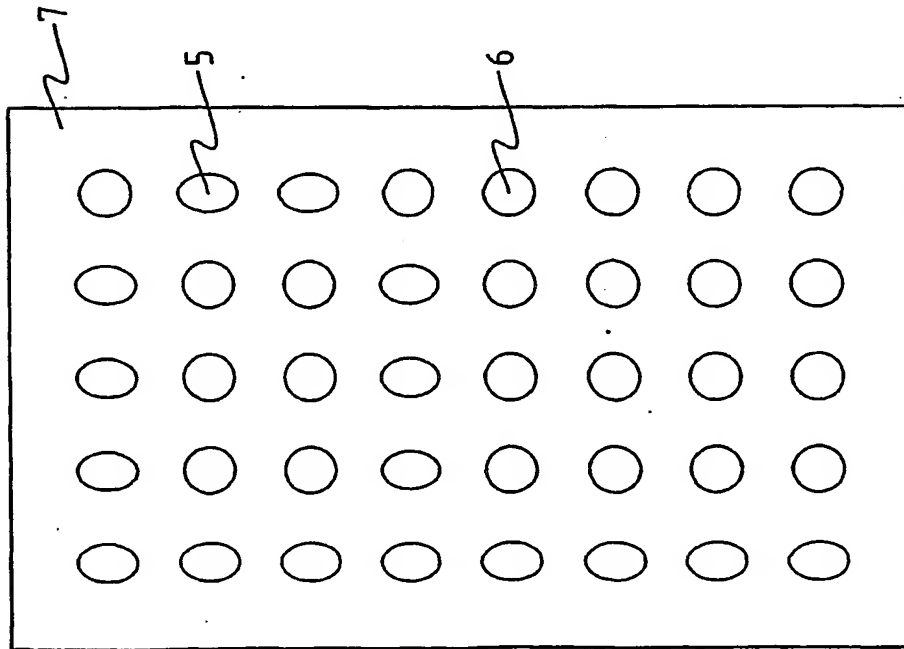


FIG. 2

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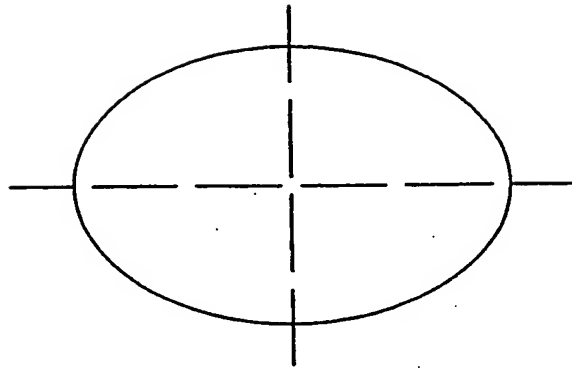


FIG. 4A

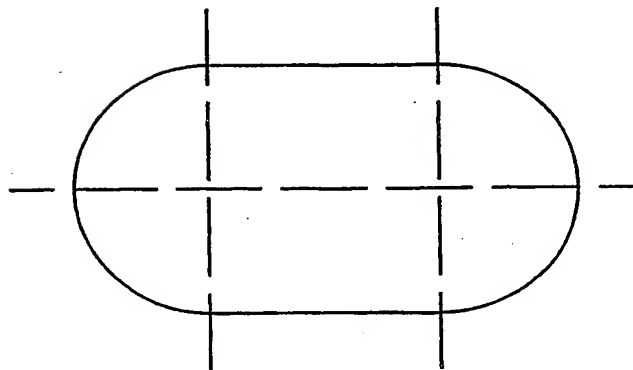


FIG. 4B

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B42D15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B42D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 18092 A (ORELL FUESSLI BANKNOTE ENGINEE ;ZINTZMEYER JOERG (CH); COLEMAN JOH) 22 May 1997 (1997-05-22) page 6, line 24 -page 7, line 5; figure 4 -----	1-10

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- *A* document defining the general state of the art which is not considered to be of particular relevance
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